

insulating material, which in turn is secured to the plate 13. Electrical connection may be made with the pin 24^a to which the end of spring 24 is attached, whereas lever 5 16 need not be insulated from plate 13 but is preferably grounded on the plate 13 and the electrical path or circuit completed in that manner through the grounded side of the primary circuit.

10 In the operation of this device, as the cam 11 is rotated in the direction indicated by the arrow, each individual cam or spiral portion of the rotating cam 11 elevates the lever 16, and by reason of the fact that the end 15 of the lever engages the abutment 25 it moves upwardly also the lever 22, thus compressing or putting more tension in both springs 20 and 24. As soon, however, as the tooth or point of the spiral cam projection 20 passes the lug 17 the lever 16 is immediately moved downwardly under the influence of the relatively stiff spring 20 and nearly, but not quite at the same time, lever 22 is moved 25 downwardly under the influence of the relatively weak spring 24. Due, however, to the fact that the springs are of unequal strength, and due also to the fact that the lever 22 has a greater mass and hence inertia, the lever 22 is more sluggish so to speak, or 30 moves considerably less rapidly than the lever 16, with the result that the contact 18 overtakes the contact 26 engaging the same or making contact which completes or closes the primary circuit. The position of the 35 parts when this takes place is shown in Fig. 3. The contacts remain in engagement for a predetermined interval or until the lever 16 engages the stop 19, whereupon the movement of the lever 16 is arrested but the lever 40 22 continues to move downwardly until the abutment 25 engages the lever 16 thus breaking the circuit or separating the contacts 18 and 26. The position of the parts when this takes place is shown in Fig. 1.

45 This cycle of operations is repeated with each individual cam or cam-shaped portion on the periphery of the rotating cam member 11, both elements 16 and 22 being moved upwardly with the contacts separated until 50 the point of the cam passes the lug 17, whereupon both levers are moved in the reverse direction but the lever 16 moving more rapidly than the lever 22 with the result that the contacts remain in engagement for a pre- 55 determined interval of time and are then separated. This action is not affected by the speed of operation, but the length of time or period that the contacts are in engagement remains the same for all speeds. 60 This is a feature of great importance in so-called battery ignition systems where the voltage of the primary source of current is not affected by the speed of operation.

It will be observed, furthermore, that the 65 engine cannot stop leaving the contacts in

engagement, for as long as the lug 17 is in engagement with the cam or any part of the cam member 11, the contacts are separated, and are not engaged until the point of each individual cam passes the lug 17, whereupon 70 the contacts are in engagement only for a brief predetermined interval and are then separated when the lever 16 engages the stop 19. This feature is also of considerable importance in battery ignition systems, for 75 the reason that it avoids the liability of the primary circuit remaining closed when the engine is at rest and thus eliminates danger of the battery discharging through a closed primary circuit. 80

The cam 11 may be driven from the shaft 10 through a so-called ratchet clutch which is indicated in Fig. 1, so that in the event that the engine crank shaft is rotated in the reverse direction the cam 11 will not be ro- 85 tated and no injury can be caused by the engagement of the sharp or abrupt points of the cam with the lug 17.

It will be understood that when the contacts of the circuit breaker are in engage- 90 ment a circuit is completed through the battery (or generator, as the case may be) and primary of a suitable induction coil, the secondary of which will be connected to the movable member of a distributor, and that 95 when the contacts are separated the primary circuit is interrupted with the result that current is induced in the secondary circuit in the usual and well known manner.

Having thus described my invention, what I claim is:— 100

1. In a circuit breaker, a cam, a pair of contact members arranged to be moved by the cam in one direction, one of said contact members having a limited range of movement relative to the other and the latter having two opposite abutments to limit said relative movement, said member having the limited range of relative movement acting more quickly than the other member when 110 said members are released by the cam, whereby the circuit will be closed momentarily by one contact member overtaking the other.

2. In a circuit breaker, a cam, a pair of contact members arranged to be moved by 115 the cam in one direction, one of said contact members having a limited range of movement relative to the other and the latter having two opposite abutments to limit said relative movement, and means whereby the 120 member having the limited range of relative movement acts more quickly than the other member when said members are released by the cam, whereby the circuit will be closed momentarily by one contact member over- 125 taking the other.

3. In a circuit breaker, a cam, a pair of contacting members which are simultaneously moved by the cam in one direction with the circuit open, one of said contacting 130